

Claims

1. An optical pickup apparatus for shining light on an optical disk having two recording layers and for detecting reflected light from the optical disk, comprising:

a light source;

an optical system situated on a path of a light beam returning from the optical disk inclusive of light reflected by a first recording layer of the optical disk and light reflected by a second recording layer of the optical disk, said optical system including:

a light condensing optical unit to turn the returning light beam into a condensing light beam; and

a light beam regulating unit to extract from the condensing light beam a partial light beam corresponding to part of a cross section of the condensing light beam; and

one or more photo detectors, situated between a position where the light reflected by the first recording layer contained in the partial light beam is condensed and a position where the light reflected by the second recording layer contained in

the partial light beam is condensed, said one or more photo detectors having a first photo detecting section to detect the light reflected by the first recording layer and a second photo detecting section
5 to detect the light reflected by the second recording layer.

2. The optical pickup apparatus as claimed in claim 1, wherein said light beam regulating unit
10 is a light splitting unit configured to split the condensing light beam into a plurality of light beams, said partial light beam corresponding to at least one of the plurality of light beams.

15 3. The optical pickup apparatus as claimed in claim 2, wherein the plurality of light beams includes a first light beam and a second light beam, and said one or more photo detectors includes:

a first photo detector having a photo
20 detecting section to detect the light reflected by the first recording layer contained in the first light beam and a photo detection section to detect the light reflected by the second recording layer contained in the first light beam; and

25 a second photo detector having a photo

detecting section to detect the light reflected by
the first recording layer contained in the second
light beam and a photo detection section to detect
the light reflected by the second recording layer
5 contained in the second light beam.

4. The optical pickup apparatus as claimed
in claim 2, wherein said light splitting unit is a
light splitting prism.
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5. The optical pickup apparatus as claimed
in claim 2, wherein said light splitting unit is a
hologram having a first hologram area and a second
hologram area, the first light beam being
15 diffraction created by the first hologram area, and
the second light beam being diffraction created by
the second hologram area.

6. The optical pickup apparatus as claimed
20 in claim 5, wherein the first light beam and the
second light beam are diffractions of different
orders.

7. The optical pickup apparatus as claimed
25 in claim 5, wherein the first hologram area and the

second hologram area have respective, different lens functions.

8. The optical pickup apparatus as claimed
5 in claim 7, wherein the first light beam and the second light beam are diffractions of an identical order.

9. The optical pickup apparatus as claimed
10 in claim 2, wherein said light source, said light splitting unit, and said one or more photo detectors are placed in a single housing and configured as a single package.

15 10. The optical pickup apparatus as claimed in claim 1, further comprising a drive unit configured to drive said light condensing unit in a direction of an optical axis of said light condensing unit.

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11. The optical pickup apparatus as claimed in claim 1, further comprising a drive unit configured to drive said one or more photo detectors in a direction of an optical axis in respect of a
25 photo detecting surface of said one or more photo

detectors.

12. The optical pickup apparatus as claimed in claim 1, further comprising an opto-
5 electrical device having a refractive index changing in response to an applied voltage, said opto-electrical device situated on a path of the condensing light beam traveling from said light condensing unit.

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13. An optical disc apparatus for reproducing information from an optical disk having two recording layers, comprising:

said optical pickup apparatus of claim 1;
15 a signal obtaining unit configured to obtain a signal from a selected one of the two recording layers of the optical disk in response to an output signal of said optical pickup apparatus; and

20 a reproducing unit configured to reproduce the information based on the signal obtained by said signal obtaining unit.

14. The optical disc apparatus as claimed
25 in claim 13, wherein said signal obtaining unit is

configured to select an output signal inclusive of only the signal from the selected one of the two recording layers among output signals of said optical pickup apparatus.

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15. The optical disc apparatus as claimed in claim 13, wherein said signal obtaining unit is configured to subtract a signal component corresponding to another one of the two recording layers from the output signal of the optical pickup apparatus.

16. An optical disc apparatus for reproducing information from an optical disk having two recording layers, comprising:

said optical pickup apparatus of claim 10;
a drive control unit configured to control said drive unit in response to a signal indicative of which one of the two recording layers is selected for reproduction;

a signal selecting unit configured to select an output signal inclusive of only a signal from the selected one of the two recording layers among output signals of said optical pickup apparatus; and

a reproducing unit configured to reproduce the information based on the signal obtained by said signal selecting unit.

- 5 17. An optical disc apparatus for reproducing information from an optical disk having two recording layers, comprising:
- said optical pickup apparatus of claim 11;
- a drive control unit configured to control
- 10 said drive unit in response to a signal indicative of which one of the two recording layers is selected for reproduction;
- a signal selecting unit configured to select an output signal inclusive of only a signal
- 15 from the selected one of the two recording layers among output signals of said optical pickup apparatus; and
- a reproducing unit configured to reproduce the information based on the signal selected by said
- 20 signal selecting unit.

18. An optical disc apparatus for reproducing information from an optical disk having two recording layers, comprising:
- 25 said optical pickup apparatus of claim 12;

a switching unit configured to control the refractive index of said opto-electrical device in response to a signal indicative of which one of the two recording layers is selected for reproduction;

5 a signal selecting unit configured to select an output signal inclusive of only a signal from the selected one of the two recording layers among output signals of said optical pickup apparatus; and

10 a reproducing unit configured to reproduce the information based on the signal selected by said signal selecting unit.

19. An optical pickup apparatus for
15 shining light on an optical disk having two recording layers and for detecting reflected light from the optical disk, comprising:

a light source;

an optical system situated on a path of a
20 light beam returning from the optical disk inclusive of light reflected by a first recording layer of the optical disk and light reflected by a second recording layer of the optical disk, said optical system including:

25 a light condensing optical unit to

turn the returning light beam into a condensing light beam; and

a light beam regulating unit to extract from the condensing light beam a partial
5 light beam corresponding to part of a cross section of the condensing light beam not exceeding half of the cross section as divided by a straight line passing through a center of the cross section; and

one or more photo detectors, situated
10 between a position where the light reflected by the first recording layer contained in the partial light beam is condensed and a position where the light reflected by the second recording layer contained in the partial light beam is condensed, said one or
15 more photo detectors having a first photo detecting section to detect the light reflected by the first recording layer and a second photo detecting section to detect the light reflected by the second recording layer.